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5. Professor Stouffer showed that an easy method of introducing point-duality into projective geometry is by considering it as the space dual of plane-duality. Such a method is in line with the desire to form the duals of every concept introduced. Numerous illustrations of the different kinds of duality were shown.

6. Professor Stratton presented briefly the results of the freshmen engineering tests in arithmetic and algebra which had been conducted under the direction of Dr. J. C. Peterson of the Department of Education of the Kansas State Agricultural College. While the tests have not been carried far enough to justify any definite conclusions, yet there seems to be a close correlation between the test grades and the ability of the students to do their college work successfully.

H. E. JORDAN, *Secretary-Treasurer.*

THE APRIL MEETING OF THE KENTUCKY SECTION.

The fourth annual meeting of the Kentucky Section was held at Centre College, Danville, Kentucky, on April 17; Professor C. G. CROOKS of Centre College was chairman of the meeting.

There were ten present including the following seven members of the Association; P. P. Boyd, C. G. Crooks, J. M. Davis, H. H. Downing, E. L. Rees, C. H. Richardson, G. W. Smith. The section was the guest of the retiring chairman at an excellent dinner. For the ensuing year Professor H. H. DOWNING was elected chairman, and Dr. G. W. SMITH, secretary-treasurer.

The following six papers were read;

(1) "Calculus ideas before Newton and Leibnitz," by Professor P. P. BOYD;

(2) "Some problems concerning the catenary," by Professor H. H. DOWNING;

(3) "A solution of Euler's equation," by Professor C. H. RICHARDSON;

(4) "Some functions of a single nilpotent number," by Dr. G. W. SMITH;

(5) "An early treatment of the quadratic transformation," by J. OSBORN, Graduate Student, University of Kentucky. (By invitation.)

(6) "A hodge-podge of mathematical nonsense," by Professor E. L. REESE.

Abstracts of the papers follow below, the numbers corresponding to the numbers in the list of titles:

1. Professor Boyd outlined the calculus ideas of Archimedes, Kepler, Cavalieri, Pascal, Descartes, Fermat, Barrow, and Roberval and presented demonstrations from the works of these men by way of illustration. Finally Newton's and Leibnitz's treatments of the problem of tangents and quadratures were given.

2. Professor Downing made brief mention of the general theory in which it is shown that if $y = f(x)$ is the equation of a curve joining two fixed points and $I = \int F(x, y, y')dx$, then for I to be a minimum (or maximum) $f(x)$ must be a solution of the Euler differential equations. Also that the Weierstrass condition, the Legendre condition and the Jacobi condition relating to conjugate points, must be satisfied by $f(x)$.

For the integral, $I = \int_a^b y\sqrt{1 + y'^2}\,dx$, which is the integral appearing in the expression for the surface obtained by revolving the curve $y = f(x)$ about the X-axis, he pointed out that the catenary is the solution of the Euler equations. The other conditions were applied and the results discussed. MacNeish's discussion of the Goldschmidt discontinuous solution was presented.

3. Professor Richardson proved the following theorem analytically, and found thereby a solution of Euler's equation

$$\frac{dt'}{\sqrt{R(t)}} + \frac{dt''}{\sqrt{R(t)}} = 0 \tag{1}$$

where $R(t) = At^4 + 2Bt^3 + Ct^2 + 2Dt + E$: *If* Σ *is a conic represented parametrically by the equations*

$$x = \frac{a_1t^2 + b_1t + c_1}{a_3t^2 + b_3t + c_3}, \qquad y = \frac{a_2t^2 + b_2t + c_2}{a_3t^2 + b_3t + c_3}$$

and if Σ' *is a second conic cutting* Σ *in four points of which the arguments are roots of an equation of the fourth degree* $R(t) = 0$, *any tangent whatever of* Σ' *intersects* Σ *in two points of which the arguments* t' *and* t'' *and their differentials when the tangent varies are connected by the relation* (1). Hence, in order to write a solution to this equation we find the condition that the line joining two points of Σ whose arguments are t' and t'' shall be tangent to Σ', the general conic which cuts Σ in four points whose arguments are roots of $R(t) = 0$. The relation obtained between t' and t'' contains an arbitrary constant and is a solution of the given equation.

4. After proving as does Peirce that in every linear associative algebra there is at least one idempotent or one nilpotent number Dr. Smith considered polynomials of a single nilpotent number j, $A(j) = \sum a_nj^n$ $(n = 0, 1, 2, 3, \cdots, \mu - 1)$ where $j^\mu = 0$ but $j^{\mu-1} \neq 0$. If $A(j)\cdot B(j) = 0$ and $a_0 \neq 0$, then $B(j)$ vanishes entirely. However if the first h of the coefficients of $A(j)$ are zero then the last h coefficients of $B(j)$ are arbitrary. $A(j)/B(j) = C(j)$ will exist (though part may be arbitrary) provided $A(j)$ does not start with a lower power of j than does $B(j)$. If $a_0 = a_1 = a_2 = \cdots = a_{kn-1} = 0$, but $a_{kn} \neq 0$ $(k = 0, 1, 2, \cdots)$ then $[A(j)]^n$ may be uniquely determined for any positive value of n.

5. Mr. Osborn briefly reviewed the first work done on quadratic transformations then discussed Steiner's transformation by means of the simple hyperboloid.

6. Professor Rees in a semi-humorous way pointed out some of the inconsistencies, the fallacies, and the improprieties of mathematics and their nomenclature, presenting thereby many of the things which so trouble the beginner.

GUY W. SMITH, *Secretary-Treasurer.*